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THESIS

THE EFFECT OF INFORMATION SYSTEMS
ON MIDDLE MANAGEMENT IN THE
AEROSPACE INDUSTRY: THE WESTCO CASE

by

Steven L. Gaudreau

March, 1992

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The Effect of Information Systems
On Middle Management in the
Aerospace Industry: The Westco Case

by

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Submitted in partial fulfillment
of the requirements for the degree of

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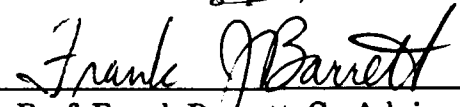
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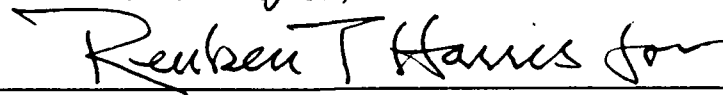
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ABSTRACT

This is a Case Study involving a company in the aerospace industry. The case attempts to analyze the trends of decentralization in an organizational structure. Additionally, the analysis will probe the effects these trends are having on middle management positions. The time frame of this thesis includes economic recession and a significant strategy shift due to current world situations. Organizational strategy, culture, subcultures, mission priorities and education are just a few of the elements that will be reviewed as contributors to these issues.

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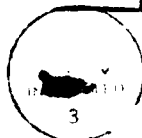


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provided. I only hope I might have the opportunity to return the favor someday.

I. INTRODUCTION

A. THE INFORMATION AGE

The information age has revolutionized the way we think, the way we communicate and the way we function in our jobs. Technology in the form of computers and more specifically, information systems, have literally forced organizations to adapt to this new environment.

Top executives, middle management, front line management and the work force make up the basic framework of an organization. While all four have been affected by information systems technology, the focus of this thesis will be on middle management. The reason for this is that generally, high level executives and low level workers are, in a sense, the extremes of an organization and the effects of any technological advances or changes appear to be more visible in these positions. For example, upper level management might act on a new computer system which assists or replaces some or all of a particular work force. The management is visible in that they are the initiators of the change. The work force is visible because, as a result, they have new roles or no roles at all. Middle management has served simply as a filter and mover of information whose

actions are not as visible to on lookers. New questions arise in this new age of information concerning middle management. How exactly do they filter and move information? How essential are middle management positions in the Information Age? What information systems do middle management need and use in order to successfully accomplish their job responsibilities? Middle management positions have long served as a guide and source of information to the worker; communicator, analyst and confident to the senior executive. How ironic that the level of technology sought in computer systems today, attempts to replace those very positions.

In the 1970's and 1980's, computers and computer systems were without question an aid to any organization that could use and afford them. It made the workers more productive, the managers more informed, and senior executives more prosperous when they had the ability to tap this information. As we move into the future and the verge of decision support technology such as Executive Information Systems (EIS) and Expert Systems (ES), we need to consider what effects they are having on middle management and the organization as a whole.

In some cases information systems serve to strengthen the manager's position while in others, they serve to replace the position. Therefore, the question of whether these information systems have advanced to the point of replacing

middle management positions becomes an issue.¹ The other issue is decentralized authority and the effects it may have on an organization.² The elimination of middle management positions and the flattening of organizations are trends that will be the focal points of this thesis. The issue of how one affects the other will also be considered. This thesis will probe an aerospace company that has experienced both to one extent or another. The result will be a case study showing the effects they have had on an organization over the past seven years.

These organizational changes tend to cause a decentralized environment dependent on many factors such as size, production and current economic situation, but is this trend better or worse for the organization? The issues of information systems and how they affect middle management are just now being analyzed as strategic in the business world. This thesis will attempt to break new ground with a study of these effects in the aerospace industry, by interviewing several management positions at Westco.³ The goal is not to determine (as some

¹ Drucker, Peter F. "The Coming of a New Organization", **Harvard Business Review**, Jan-Feb 1988, p. 45.

² Gerstein, Marc S. **The Technology Connection**, Addison-Wesley Publishing Company, Reading, Massachusetts, 1987, p. 23.

³ Westco is an anonymous name as are all associated names with the exception of General Motors. At the request of the management, in a time of unstable jobs and an uncertain future, I chose to honor that request. The anonymity in no way distracts from the purpose or contribution of this paper.

have) whether information systems will replace middle management positions. Nor is it to determine whether it would decentralize for their benefit, but only to serve as an indicator of how it has affected them and their organization thus far, and any underlying trends or reasons behind it.

Chapter II will provide a basis for the methods used in the data collection of this case. Included are literary references to establish the methods as well as a short analysis of personal techniques used and an overview of the results. Chapter III is the presentation of the case itself which describes the chain of events and decisions that transpired from the beginning of the company's public venture, through its strategy change and through the recent recession. Chapter IV is the analysis of the case. This chapter will provide sufficient discussion and references in order to understand the reasons for some of the decisions that were made and develop a pattern or model from which to learn.

II. METHODS

A. TEACHING CASE METHODS

A teaching case allows the classroom to read and evaluate a real world scenario and make a determination as to the actual or proposed outcome. In this thesis, the scenario is broken down in two cycles, one a result of the other. There are two types of case presentations.⁴ The first is called an *Issue Case*, where the writer presents a problem and the reader presents a recommendation for a solution. The key here is that no decision has been made. The second kind of case is called an *Appraisal Case*, in which a decision has already been made and the readers simply evaluate the decision or decisions. This thesis combines both types based on the events that followed Westco's public venture. As a teaching method, they complement each other in that the events of the first cycle lead to a decision made by the company as in the appraisal case. This decision leads the company to a chain of events that have yet to be resolved as in the issue case.

⁴ Davis, Robert T. "Some Suggestions for Writing a Business Case", **Harvard Graduate School of Business Administration**, Intercollegiate Case Clearing House, Boston Mass. (Note)

In that this is a teaching case, more emphasis will be given to the circumstances and the issues rather than the solutions. Differences in emphasis will be left to the individuals reviewing this case. The advantages of the teaching case involve the intricate dissection of the problem and the subsequent brainstorming that could lead to a variety of solutions. The disadvantages are not knowing how the real situation turned out or why. There also exists the inability to employ the solutions to the problem in that we are confined to a class room. The class may only rationally speculate, but the pedagogy of this case method best suits the mission of training men and women not only to know, but to act in a business environment.⁵

Another advantage is its efficient, economical use of time. It enables students to develop and discover their own unique framework for approaching, understanding and dealing with business problems as well as being intellectually stimulating for the faculty. In the class room, the teaching case works because it is supportive of a culture that places high values on review and innovation and produce "brilliant results."⁶

These unique aspects of the teaching case method go beyond the limited scope of a survey or an often times one sided

⁵ Christensen, Roland C. **Teaching and the Case**, Harvard Business School, 1981, pp. 23-25.

⁶ **Ibid.**

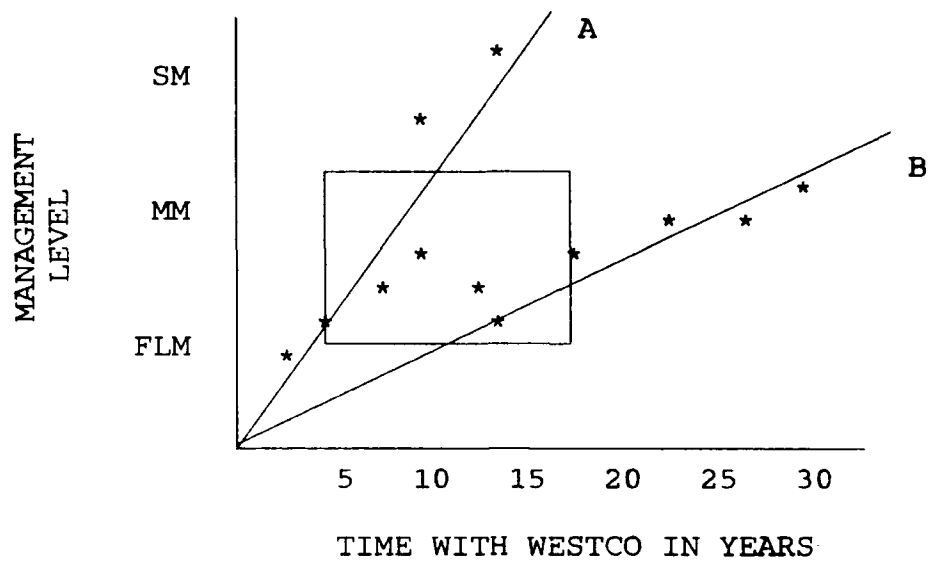
documentary approach. It allows decision making analysis to be brought to its full potential.

B. QUALITATIVE DATA

1. Samples Used for Interviews

Data collection was accomplished by means of prepared interviews. Although the interviews were standardized initially, discussions varied based on the age and experience of the manager being interviewed. Interview arrangements were made through personal contacts of old acquaintances and as such there was no reluctance on the part of Westco in allowing the interviews to continue in spite of its extremely tight security.

Although constrained somewhat by time and personnel, the goal of the interviews was to reach a wide variety of "middle managers" in terms of age, experience and seniority. There were twelve managers interviewed. These included a mix of new, front line managers, as well as managers with 28 to 30 years of experience, division and department managers. For a small group, the mix proved very informative because of their varied opinions concerning their positions and the information systems they used. Exhibit 1 shows a graphic breakdown of the age and seniority of the managers interviewed. Line A represents the managers who have followed a path to upper level management positions but not necessarily as a result of strong educational or training background in information



SM - Senior Management Level
MM - Middle Management Level
FLM - Front Line Management Level

EXHIBIT 1

technology. Line B represents the managers who have stayed on because of experience and value to the company through expertise but only hold mid-range management positions. The boxed area represents the cluster of managers who seemed to be heavily involved in computer technology and information systems.

2. Nature of the Interviews

The interviews were broken down into three themes; social, technical and socio-technical. The social phase sought to find the individual's basic philosophy of management in large organizations. It gave them a chance to relate personal experiences of managerial success and accomplishment. This phase served a dual purpose as both an ice breaker and provided a brief glimpse into the attitudes and views of the person being interviewed.

The second part of the interview was the technical phase. This phase served to gain an understanding of the manager's educational and technical background. From this data came some insight into the reasons for some of the decisions made in a large organization heavily reliant upon computer technology. From this phase of the interview, a more detailed understanding of the manager's responsibilities and their job descriptions (which were never apparent from their job titles) was achieved.

The last theme of the interview was the most important. The socio-technical phase required responses of managers that gave an impression of how they think from a technological viewpoint. This data revealed some of the driving forces behind their organizational culture. It made clear some of the reasoning of current trends toward organizational decentralization. This phase of the interview also exposed some of the reservations managers held due to their fears of job and position elimination. It also afforded managers the opportunity to describe either what they would do differently or how they would change the structure of the organization if they had the power to do so.

3. Data Analysis - (The collection)

Data analysis focused on middle management's involvement with information systems. Based on the previously mentioned themes, the "big picture" was formed through the collection and analysis of the managers' quotes, stories and opinions.

Throughout the interviews, specific quotes were recorded which helped to form ideas about how managers felt about their job, their environment, their computers and the joys and fears associated with each. As managers related their stories, they began to paint a picture which made clear how the organization functioned. It became possible to distinguish between stories which were consistent and stories

which were motivated by individual dissatisfaction. Finally, on several occasions throughout the interview, opinions on specific matters were asked. From this information, middle management conveyed feelings of how they felt the organization would run if left to them as opposed to upper level management. This was an important data collecting technique because these were the only opinions of managers who had a grasp of information systems and technology and who would inevitably become the future executives and CEO's.

Based on the previously mentioned techniques, each theme of the interview provided the building blocks for a knowledge base about the company. Initially, an understanding of the managers and their personal backgrounds was developed. Then their choice and use of technology for the company became apparent and finally, the results of the interaction between man and machine, their likes and dislikes.

4. Data Analysis - (The Results)

Of the twelve interviews conducted, manager experience ranged from low level, front line managers to upper level section and department heads. As previously mentioned, the interviews, although specific in some areas depending on the job, revolved around three major themes: social, technical and socio-technical.

Most middle managers seemed to have a firm foundation of management skills. They saw the importance of the people

who worked under them as well as listening and decision making skills. Their job descriptions did not always match their jobs, and a decentralized technological structure was, in part, the cause of this. Education for the most part involved degrees in Management Information Systems (MIS), Computer Science (CS) and sometimes combined with an MBA. At a very minimum, all underwent some type of computer systems training at the company. Most felt that their greatest achievements involved a mastery of information systems in one form or another, yet few agreed on what they thought made a good information systems manager.

Technologically speaking, most of the more junior managers saw the writing on the wall, so to speak, as far as computer systems knowledge and their future. There seemed to exist a well defined line between upper level managers who had not been caught up in technological education and those who were. Some managers were interviewed without much in the way of information technology skills and the lack of knowledge was evident. The implication is that upper level management does not require MIS skills for manager employment. Most of the middle management, however, felt as though a manager coming into the organization needed to have, at the very least, a solid background in and an understanding of computers and computer systems.

Westco had definitely flattened over the years, but for reasons to be discussed, were working hard at thwarting or

at least controlling that trend. Their infrastructure seemed to be creeping more and more toward dependency on various systems limited only by financial constraints. Senior executives seemed to have little or no use for information systems as far as an overall strategy. They only got involved with the systems if management could prove its usefulness or if it might benefit them directly.

Those who had been with the company for a long time and had no IS technological savvy were offered early retirement incentives. E-mail was hardly used although available. "Sabotage" and "back stabbing" were cited as examples of using IS technology as a weapon. As tools, managers felt they did not have enough and what they had was outdated and in need of upgrading. Anyone who knew anything about computer systems usually got involved in design or redesign changes. The current IS management department was created in house out of necessity rather than prior planning. Middle management positions have been eliminated over the years at Westco but not directly because of IS technology. Management positions disappeared but managers did not. They were simply reassigned and retitled at different levels. The same generation gap discussed earlier was split on whether or not information was power. More than half the managers interviewed felt they could not do their job effectively without their information systems. Most recommendations for change or redesign of current systems involved

standardization, more connectivity and better utilization of what they had through education and upgrading.

In general, the younger the manager, the more technologically oriented and educated. Older employees accepted the technology they had to work with and although they had some ideas of how new IS could benefit them, seemed to be content with the status quo. Westco seemed to be struggling in a technological transition phase of leadership in terms of decision making and strategic planning. Information systems seemed to place more and more emphasis on including this technology in upper management decision making and analysis. The senior executives did not appear to be the driving force behind the use of information technology, however, the more middle management got involved with those systems, the more upper level management had to educate themselves on its potential and not leave the decision of its use to lower management levels.

III. THE CASE

A. THE TRANSITION

1. A Nonprofit Organization

For twenty-five years, Westco functioned as a nonprofit company, being one of five similar plants with different product lines. Its managers' primary responsibilities were to redistribute funds, maintain and execute a fixed annual budget. As a subsidiary company owned by a large medical corporation, its mission was to apply electronics based technology to products and services for the defense market, and existed at the time as a "technical treasury." Its overall strategy was to be at the cutting edge of technology. At some point in 1985 two events occurred. The medical corporation decided that carrying Westco as a nonprofit organization would become more of a burden than an asset for reasons unknown to those interviewed. Secondly, Westco was being considered for purchase as a profit making subsidiary of General Motors. This involved a switch in strategy from government and defense contracts to the commercial automotive market.

So in 1985, at the height of defense build ups, Westco became a public, profit generating enterprise. The transition

was made with existing management and contracts in place. Planning was limited to a five year review of the way the company would try to survive as a competitive, profit generating company in the private sector.

By 1986, however, about a year after the transition, Westco reported a 200 million dollar loss, largely due to the decline of defense contracts, the fact that several contracts had remained in place during the transition without the advantage of being renegotiated as profit contracts, and a declining economy which was felt all the way up to 1990 (see Exhibit 2). Although large profits were not anticipated during the first year, this significant annual failure made it clear that something more had to be done. In 1987, Brian McMasters, a highly successful CEO from one of the other five associated plants that comprised Westco, was called in to pull the company out of a hole. The task was enormous. Operating with the same management and in the middle of existing civilian and military contracts, the company had to reconstruct its organization and retrain its managers. Many of the managers who would undergo the change had been working in a nonprofit environment for over 20 years. The transition would require new vision and new technology.

2. New Sheriff in Town

Brian McMasters arrived within a year of the company's first profit oriented year. He had big ideas and big purse

WESTCO REVENUES AND PROFITS
(in millions)

	1990	1989	1988
TOTAL REVENUES	11,723.1	11,359.0	11,243.6
NET INCOME	577.2	632.4	653.3
EARNINGS	726.0	781.2	802.1
TOTAL ASSETS	12,727.5	12,200.1	-----
CASH & CASH EQUITIES (year beginning)	652.4	698.3	731.3
CASH & CASH EQUITIES (year ending)	452.9	652.4	698.3

EXHIBIT 2

strings to implement those ideas. The idea was to create small business units (known heretofore as BUs) within the company. Each BU was instructed to "plan the work and work the plan." Each involved a separate internal function of the company that already existed. As the BUs evolved, the goal was to keep the units that were successful and eliminate the ones that were not or absorb them into other BUs. This would not only remove unnecessary BUs, but unnecessary, expensive managers as well.

The Business Unit concept was considered to be "the wave of the country" and was said to have been tested in other large diversified organizations with much success. The BUs themselves were associated with major product lines of the company such as Sonar or Radar and several projects might exist under each. Business Unit Managers (commonly referred to as BUMs) were essentially Division Managers and the systems they used ranged from networking to individual spread sheet programs, all of which were PC based. The one exception was a mainframe database system used by the entire organization for ordering parts. This technology included the use of ordering part graphs and charts by telephone and eliminating the middle man and saving much time. The initial results of the BU process seemed to be accomplishing what was originally planned. Within three years time they had reduced work force and management numbers from 17,000 to 7000.

To encourage and develop these BUs, each business unit manager had free reign to finance and direct their own units as they saw fit. In that many of these managers were relatively young and educated in the Information Age, information systems became an asset they could not do without.

The new sheriff's paradigm would significantly affect the organization, however, whether it was for the best was unclear. As for the managers, it was a unique opportunity to stand out and make a difference rather than playing an insignificant part of a non-competitive company. The competition within would become intense and was partly to blame for the affectionate term BUM.

3. Little Kingdoms

The result of Brian McMasters' plan for his well funded BUs was that they flourished in terms of productivity and program usage. The favorable results were not necessarily in financial terms due to the oncoming recession and the loss of several government contracts. One of the departmental managers had stated that "it was too early in the life cycle to tell if the plan was going to be effective in other areas." The business unit managers used expertise within their units to stock themselves with the latest computer technology in terms of hardware and software. Some examples of these would be PC based network systems that transferred information within the company from engineering to data processing and

back to the parts lab. Others included software programs and spread sheets that more efficiently tracked spending, accounting and part orders. Finally, as mentioned previously, the most notable was the large part ordering database system with telecommunication properties that allowed part order descriptions by phone. Some ideas benefitted the output of the individual BU, while others developed automated systems that the entire company would benefit from. In either case, the competition between BUs was evident and survival of the fittest was anticipated.

With the newly acquired power and authority of middle management came power struggles. Subcultures formed within the organization and the BUs became known as "Little Kingdoms." These power struggles came in the form of policy interpretation and disputes between the BUMs and the MIS department. The company became politically unstable within the middle management ranks. Under the IS management division, there were rules and policies that governed the acquisition and control of computer systems. However, the newly acquired power that was given to the BUMs gave them a license to do whatever they saw fit. To the MIS people, they became "renegades" and there seem to be a constant battle between them and the BUs.

As an apparent lack of control loomed over the horizon, no one could look to the new sheriff for guidance because after he initiated his plan and set the wheels in

motion, he retired. He was hired to turn the company around which he did, whether the company would have benefitted had he remained is unknown. Some feel that a "loose cannon" is necessary to turn the company around, and then be replaced by a CEO who can manage the change.⁷ The elimination of the unsuccessful BUs and their managers was never accomplished.

B. BITING THE BULLET

1. Another Fine Mess

With the Little Kingdoms in place, it was hard to see the coming storm with the increase of business and stabilization distorting their vision. The company was headed for another mess but this time not entirely in financial terms. The problem was a lack of control and standardization as a result of large cash flows and mass decentralization. Now, a different problem faced middle management.

The company profits were not rising to expected levels due to the recession. Upper management, now somewhat experienced in the private sector, "didn't know how well the BUs would work" and began to reevaluate the company's budget and expenses. What they found was a highly exaggerated budget request, redundant information systems, and computer systems that could not communicate with one another.

⁷ Cash, Mcferlan, Mckenny and Vitale. **Corporate Information Systems Management: Text and Cases**, Richard D. Irwin, Inc, 1988, p.42-69.

As capital increased and BU information systems grew, Westco developed a Management Information Systems department to monitor and control information systems. Susan Johnson, the Information Systems manager at Westco, was an advocate of maintaining centralized control during the whole decentralization process. She was not able to change the tide then, but she would be ready when the time came to recentralize, or at least put any further decentralization in check.

John Alister, a Lab Manager at Westco, (see Exhibit 3) stated that "large organizations will gravitate from a centralized mode to a decentralized mode in cycles." He stated that the modes were synonymous with contracting externally and experimenting internally respectively. He further stated that all this aside, "organizations tend to decentralize when there is a lot of business." This high level manager saw mainframe technology coming back with more flexibility and more cost effectiveness than the current distributed systems. He saw Westco as merely "chipping away" from centralization. The mode a particular organization gravitates to may be a result of its structure or managerial style alone.

Anytime a company's structure is defined by small scale subunits, whether by design or managerial style, it will inevitably place demands on organizations to adopt more decentralized management structures as in the case of Westco.

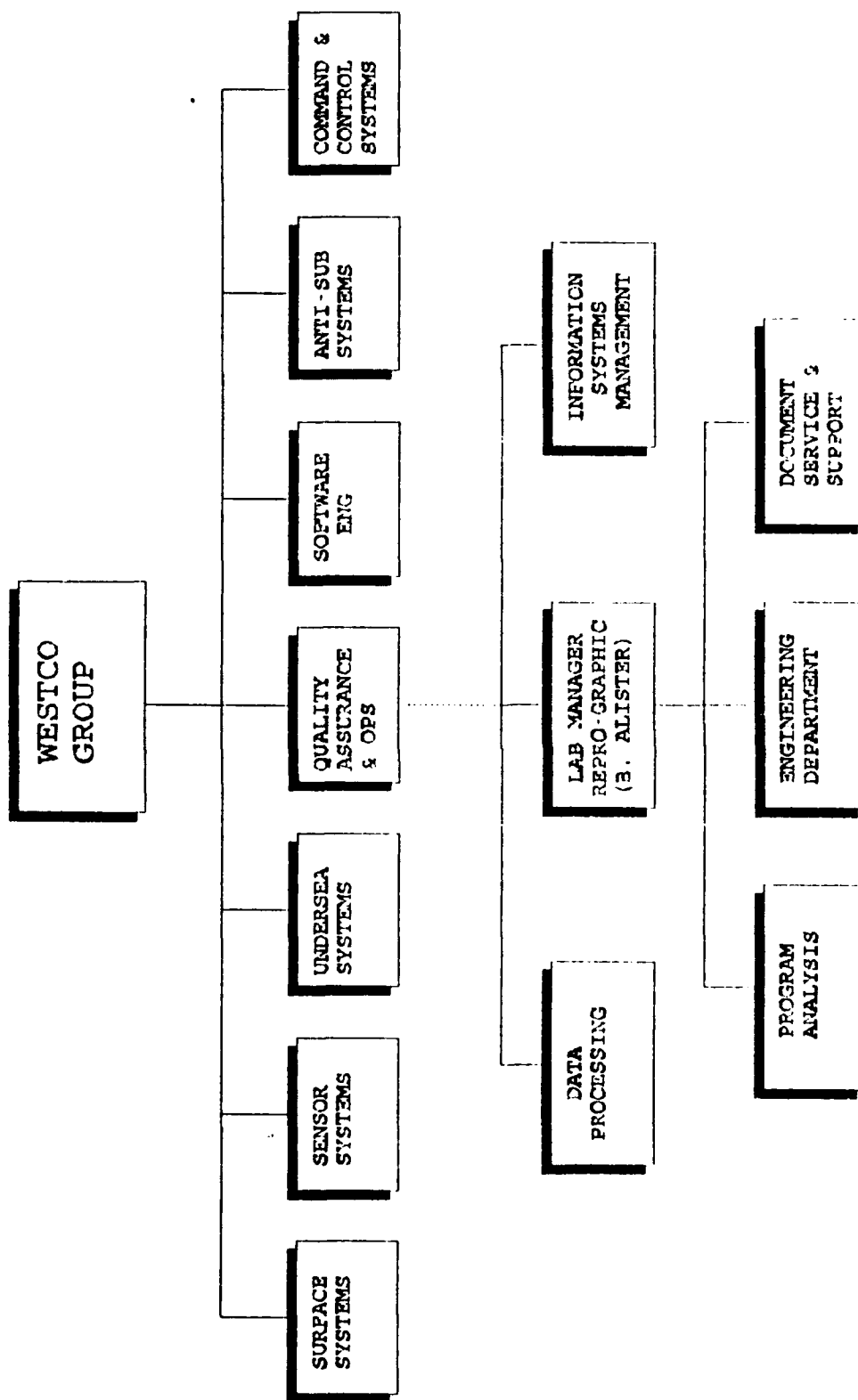


EXHIBIT 3

"Coordination difficulties, which previously would have made such decentralization impractical, will be eased considerably by rapid growth in telecommunications technology and distributed data processing. The net result will be the benefits of decentralization without many of the traditional costs."⁸

2. Recentralization

It was discovered during the recentralization process that management positions were created that were unnecessary. Over nine different databases in various BUs were found with redundant information. These databases included several applications ranging from part orders to accounts and payrolls. One of the major IS projects that occurred during the recentralization process was the creation of system that would combine all the information of the redundant systems. Since the budget requests were so exaggerated, the voluntary cuts by the BUs were far more than they could afford and this was discovered too late. Once the new budget was approved, it was almost impossible to get the money back for the purposes of developing, updating and purchasing new information system components.

Mr. McMasters also planned for the release of those managers whose BUs were unsuccessful or whose BUs might have

⁸ Gerstein, Marc S. **The Technology Connection**, Addison-Wesley Publishing Company, Reading, Massachusetts, 1987, p. 23.

been successful but not the manager. What happened was that all of the managers stayed and were simply repositioned in different levels with new job titles. The decision to remove management positions was based on the theory that IS technology was doing sufficient information handling to no longer require the services of some managers, who at this point seemed to act only as "relays."⁹ Business unit managers who no longer filled a position originally designed for them, were used as "idea men." They were moved to other departments where new commercial products were being developed and were asked to provide input in the form of management and design considerations. They were limited of course in the authority of their new positions but were expected to use the same skills.

Recentralization was difficult due to the disparity in hardware. Some offices had advanced Macintosh systems while others had IBM and IBM clone systems, none of which could communicate with each other due to bit character representation as well as the inability to handle the transfer of information within the organization. In other words, the decentralization led to a proliferation of homogeneous systems. Each BU required different hardware, software and applications of each. E-mail, the simplest and most efficient form of intercom, was rarely used. The goal now was for

⁹ Drucker, Peter F. "The Coming of the New Organization", Harvard Business Review, Jan-Feb 1988, p. 46.

departments to standardize equipment and increase communication between machines and networks. The problem was that this was to be done with no one controlling the overall flow of information within the company, no money and a company bracing for a recession.

3. The Lean Years

To complicate matters even more, Westco had been a company that up to this point had thrived on military contracts and government funding. The interviews were conducted after the war in the Persian Gulf, the fall of a Soviet empire and a diminished threat overall. The United States was running out of enemies and money, which made for some lean years to follow. This became apparent in the middle management layers as one data processing analyst pointed out, "Look, I've got a hole in this terminal, this one doesn't work, and I can't do anything about it."

It has been suggested that information systems are successful at the subsystem level.¹⁰ The question arises, is the entire organization slave to that subsystem, or can the organization function separate and apart from those systems? In other words, as long as an organization has the ability to work in an environment that allows its decisions to be motivated by IS technology rather than controlled by it, then

¹⁰ Carter, Nancy M. "Computerization as a Predominant Technology: Its Influence on the Structure of Newspaper Organizations", *Interfaces*, 17:3 May-June 1987, pp. 247-248.

the company is not a slave to those systems. This is exactly the situation Westco found itself in. The technology they had was geared to be built upon. Instead, they were forced to work with the systems they had and the financial constraints they incurred. These constraints included systems monitoring, limited use of CPU time, tracking of personnel usage and down time costs. Systems needed to be modified to stay current and remain state of the art. This of course could not be done without high level approval. They had become so dependent on the old systems that they were forced to remain technologically stagnant. This frustration was sensed in a remark made by a program analyst who recalled, "there was a big crackdown on illegal software, and there was no money to replace it."

The organization preferred to rely on the intuition of its leaders instead of a formal strategic planning process. IS management at that point became a "muddling through" process instead.¹¹ Individuals and departments that needed new systems had to essentially design, economically evaluate and be prepared to implement their own systems. They had to be justified beyond a shadow of doubt before anyone could spend a dime.

With no apparent strategy other than five year long-range plans, Westco was at the mercy of incremental decision

¹¹ Bryson, John M. **Strategic Planning for Public and Nonprofit Organizations**, Jossey-Bass Inc., 1988, p.13.

makers and an unknown future. Other management options included an increase in the civilian production lines or products, such ideas as "smart highways" and 3-D sound systems, and other advanced technological footholds. Lean years require minimum staffing and maximum output effort, not all of which were being accomplished. It was a challenge that Westco clearly was not prepared for but now had to face.

IV. ANALYSIS

A. THE ISSUES

The changing role of management is due largely to the changing role of technology in organizational systems. As decision support systems and expert systems become more complex internally, and more efficient and user friendly externally, experts speculate on the impact these information systems will have on middle management positions and the organizations to which they belong. "The important aspect is that information systems development is now in a language that management can and must understand."¹²

Much of this depends on the job. Computer systems appear to have remained centralized in authority in some cases, and cause decentralization in others.¹³ This case focuses on an organization where the dependency on information systems technology seems inescapable. It has been suggested that one of the key factors in analyzing this impact is "the objectives

¹² McAulay, Kaye. "The Changing Role of Management in Information Systems Development", *Interfaces*, 17:3 May-June 1987, p. 53.

¹³ Robey, Daniel. "Implementation and the Organization Impacts of Information Systems", *Interfaces*, 17:3 May-June 1987, p.73.

of management."¹⁴ Issues to be explored are: how do managers use their computers to strengthen their position? To what extent are managers dependent on the systems and to what extent are the systems a burden? What, if any, is the underlying strategy for the organizations information systems? The answers to these questions are based on two factors. First, technological factors which include user friendliness, environmental conditions and support provided to the users. Secondly, organizational factors such as IS management's readiness for change, user attitude toward end user computing and user independence from an information systems management department.¹⁵

If we assume favorable conditions in terms of financial and moral support in these two factors, then a gradual trend toward decentralization might occur. As was mentioned before, the origins of this trend may stem from organizational structure or managerial preference or both. Favorable conditions here might suggest an experimental environment mentioned previously by Mr. Alister. It is probably too early in this "age of information" to pin point any one factor that controls these trends. In this case, it was clearly a result of a management style that involved experiment and considerable risk. In the opinion of most middle managers

¹⁴ Ibid, p. 75.

¹⁵ Rivard, Susanne. "Successful Implementation of End User Computing", *Interfaces*, 17:3 May-June 1987, p. 26.

interviewed, "what was lacking was a long range strategic plan." Eventually, middle management positions would be strengthened to the point where high level executives could not operate without their own systems. This is an interesting concept in light of the fact that we still live in an early stage of technological advancement where CEOs are barely computer literate.

Historically, machines and computer technology sought to revolutionize organizations by replacing the work force with more efficient, cost effective technology. Until recently, management positions did not have the same concerns and fears of the work force in terms of being replaced by a machine. However, software programs such as Decision Support Systems (DSS), and Expert Systems (ES), have led to such systems as Expert Information Systems (EIS), whose purpose is to make decisions in place of managers. In situations where technology will not replace management positions, only the managers who recognize information systems as a competitive edge will be able to advance. The advent of man-machine interface in corporate environments had a significant impact on the business world. "Yet the basic mission of management has not changed: to find a competitive advantage wherever possible."¹⁶ In that sense, information has become strategic.

¹⁶ Friend, David. "Executive Information Systems: Successes, Failures, Insights and Misconceptions", DSS Transactions Conference on Decision Support Systems, April 21-24, 1986, p. 35.

These new strategies involve reorganizing and restructuring organizations. Now the fear of job replacement for managers becomes an issue. The fear is substantiated in the prediction that within the next 20 years, this country will have only half of the current management levels and only about one third of the management positions in those levels. Some even consider the best organizations in the world are run without any middle management whatsoever such as hospitals and orchestras.¹⁷

B. DECISION MAKING PROCESS - CYCLE 1

The issues of decentralization and management's job security played a significant role in the chain of events that occurred from 1986 to the present. When Westco became a profit producing organization with a disappointing first year, the elimination of management positions became a reality with the onset of BUs. This was the result of a strategic move on the part of Brian McMasters. A strategic move that virtually ignored any external and internal threats and created an intense competition within the organization among middle managers. But why were these decentralization problems not anticipated? Why was all technological planning left to the workers and individual managers?

¹⁷ Drucker, Peter. "The Coming of the New Organization", **Harvard Business Review**, 33:1 Jan-Feb 1988, p. 45.

One of the problems we find in a world where large organizations are in a technological transition is that "decision makers are unsure about how technology and people will ultimately fit together."¹⁸ It would seem that Mr. McMasters had only two options. The first was the option he chose in delegating all technological decision making to subordinates. The second option was to utilize all available assets to create up-to-date, state of the art technological offices with standardized equipment. The latter approach has been attempted several times in other organizations, usually with CEOs that have no computer science/management experience or background. "What they lacked was a reasonably confident sense about what may happen when people are placed in the totally electronic office of the future."¹⁹

Another factor that influenced Mr. McMasters in his decision making process was the pressure of reducing the number of management positions. The reason for this is twofold. First, it cuts down on the company's financial expenditures. Secondly, it was set in place to allow for a less complex communication structure, i.e., the fewer managers, the more efficient and less chance of distorting information flow. Ironically, the managers who were targeted for removal were never removed. The managers that did not

¹⁸ Strassmann, Paul A. **Information Payoff**, The Free Press, 1985, p. xiv.

¹⁹ *Ibid*, p. xiv.

stay were ones who could not cope with the technological changes within their organization. In past experiences, organizations found they did not know "what to do with workers who became unemployed because of an inability to deal with the new office equipment."²⁰ Whatever the problem solving process was, no matter how decisions were made, these two factors stand as the most influential in guiding Westco in its decision making processes.

C. DECISION MAKING PROCESS - CYCLE 2

The second and more formidable problem came shortly after the decentralization problem was in full bloom. The recession had firmly set in and the existing equipment that was compatible was now old and in need of upgrade. The new equipment was spread thin and it was hard for a manager in one department to know how a manager in another department ran his computer equipment. There remained an organization with a serious lack of internal communication in terms of computer systems, little or no standardization, several redundant systems and databases, and no manager to monitor the flow of information throughout the company. The idea had no plan for a strategic follow through. The CEO assumed that the concept would be self sustaining via his middle management. In lieu

²⁰ Ibid, p. xvi.

of his retirement, a strategy that planned for an unstable economic future would have been beneficial.

The answer initiated by the MIS department originally came from an idea Mrs. Johnson had concerning the centralization of the company's technology. Projects were initiated in an effort to create systems that merged several databases into one. Automated systems were created allowing users from any department to participate. A distinction had to be made in the "separation between professionals and users."²¹ It was time for free lance programmers within the business units to stop accumulating and creating hardware and software within their own departments. Concentrated efforts now had to focus on the recentralization of information systems. This would not prove to be an easy task due to the complexity of the operation and the lack of funds. All else had to be adjusted in terms of CPU time and man hours. Computer usage now had to be tracked, users had to be checked and accurate records needed to be maintained. The problem exists to this day and the only certainty in all of this is that the process will be a long and slow one.

D. THE COST OF RECENTRALIZATION

An understanding of whether the trend of computer technology leans toward centralized or decentralized control

²¹ Ibid, pp. 34,35.

has always been the argument among information system professionals. This becomes extremely important as a factor of organizational structure and job design. The centralization/decentralization issue has been studied since the early 1950's.²² Top management in powerful Japanese steel companies see information systems technology as a "means to centralize control and make long term commitments to an increase of comprehensive planning."²³ It would seem then, that as information technology moves forward in time and progresses more efficiently, the effect of centralization or decentralization depends on the extent to which top level management supports and/or involves itself with those systems. It is important to point out that our focus is on a large, dynamic, diversified company, as computer technology is low in "regressive firms" that house rigid organizational structures.²⁴ Simply put, we are not concerned too much about small business organizations whose use of information systems technology does not lead to a competitive increase in productivity. It has even been suggested that increased

²² Yoon, Se Joon. "An Exploratory Study of the Relationship between Advanced Manufacturing Techniques and Organizational Structure", 1988, p. 48.

²³ Gold, Bela. "Factors Stimulating Technological Progress in Japanese Industries: The Case of Computerization in Steel", *Quarterly Review of Economics and Business*, Vol 18-N4, 1978, p. 8,9.

²⁴ Bartezzaghi, E. "Computers, Management and Organizational Reflections on a Pilot Study", *Information & Management*, 4, 1981, p. 249.

centralization, for example, was not a result of technology, but of managerial "philosophy and choice."²⁵ The last aspect of this controversy lies within the hardware itself. The use of mini computers, networks and decision support software has become a major factor in leaning toward one philosophy or the other. This is a cost of recentralization, one that cannot be afforded at this stage of the game. This will require, as previously mentioned, a possible reconstruction of management ideas and paradigms. The components of information systems will ultimately be only half the cost of recentralizing. The other half will exist in the time and effort required to manage what they have been forced to use in the interim.

A little hindsight would show that the root of this problem stem as far back as Brian McMasters' original plan. He came with initiative and with ideas but no practical background or training in the marriage of an organizational structure and IS technology. Centralization should have been the overall goal and any decentralized efforts controlled. Formal and in depth strategic planning will be the means by which any large company can expect to make major technological transitions, or transitions of any kind, while still maintaining control in the years ahead. The cost may otherwise be too great.

²⁵ Gash, Debra Carol. "The Effects of Microcomputers on Organizational Roles and the Distribution of Power", 1987, p. 24.

V. CONCLUSION

A. THE COMING MANAGEMENT

Throughout the interviews, although computer education was not a prerequisite for management level positions, it was what most front line managers felt was essential for advancement. A senior manager believed that a computer was nothing more than a tool and that the only technical ability required for a manager was "the ability to type" and that "he could always learn the rest as he goes." In reality, this did not seem to be the case. One of the managers interviewed who had no computer education or background, had trouble maintaining a conversation with me throughout the interview with respect to information systems. He also confessed to spending a good portion of his time going to others for answers to computer questions.

Therefore, as management continues to integrate with computer technology and information systems, the managers and CEOs of the future will have to be computer literate and possess an intimate knowledge of IS requirements and resources. The managers of Westco who had vision, who had power at lower levels and who knew the flow of data within the organization, were those with computer science/management educations and

backgrounds. It has been suggested that decentralized trends may be cyclic. The manager of the future will have to gauge when it is time to run technologically, and when it is time to slow down, reevaluate and reorganize.

B. ORGANIZATIONAL CHANGE

Businesses in general have gained momentum over the past few decades as a result of computer and information technology. The only limiting factor thus far has been the inability of people to grasp this inevitable change. Success and failure of some businesses depend on whether information systems were used at all, and if they were used, were they used as strategic weapons or merely as a convenient tool.²⁶ It has already been pointed out that the internal impact of information technology on an organization may well lie in the reduction of managerial levels as well as over all reduction of management positions. This combined with competition from the outside world proves to be a formidable change that many top management levels refuse to deal with.

These kinds of changes will require vision on the part of the leader. The kind of vision required to plan and prepare a strategy for restructuring the work place. Whether much of this technology is actually needed is debated and is not the focus of this paper. Nevertheless, managers typically invest

²⁶ Gerstein, Marc S. **The Technology Connection**, Addison-Wesley Publishing Company, Reading, Massachusetts, 1987, p. 5.

in new technology because they believe it will allow them to accomplish their operations more quickly and at less cost.²⁷ From that point on, managers began to realize the more they know about information systems technology and how to manipulate it, the more of a competitive edge it gives them.

Westco is a company that has thrived on its technological knowledge and advancement, but only in the ranks of its experts and engineers. Information systems and the management of information have been taken for granted as a responsibility of the middle manager. In Westco's short career as a profit making company, the burden of computerization and connectivity have been left to the ranks below the executive level. The reason for this has almost always been the lack of training and education of upper level management.

Most people fear the unknown and computer phobia is no exception. Computer phobia involves a fear of computers in terms of usage, functionality and adaptability. In this case, it could just as well mean the fear of changing over to new technological systems within the organization. This is not something you can force on an organization yet the change is inevitable. Computer technology and information systems will become an integral part of planning for the manager of the future. World events and economics will never be a constant.

²⁷ Zuboff, Shoshana. "Automate/Informate: The Two Faces of Intelligent Technology", *Organizational Dynamics*, Autumn 1985, p. 7.

Planning the future of any dynamic organization requires the benefit of a detailed strategic plan and a budget that prepares for some of the obstacles that Westco had to face in a relatively short period of time.

C. STRATEGIC THINKING

The dynamics of an organization require the analysis and planning of several different variables. Bryson suggests a review of the company's stakeholders, goals and mission statements, internal and external threats, and the implementation of a plan based on those factors.²⁸

Much of this depends on whether the style of the manager or CEO is that of an entrepreneur, or at the other end of the scale, a reactionary. In the case of Westco, the CEO can afford to be neither. Long range planning must be met with enough flexibility and preparation to react to situations such as the financial and structural problems that Westco encountered.

Westco did not have an accurate portrayal of its departmental expenditures. Had it planned for a reduction of funds in terms of profit loss or recession, it might have been much more able to manage the company through the lean years and the problems brought about by decentralization.

²⁸ Bryson, John M. **Strategic Planning for Public and Nonprofit Organizations**, Jossey-Bass Inc., 1988, p. 33,34.

The reality of any organizational leadership needs to include in its thinking the inevitability of computer technology and the necessity of information systems. This requires the education and training of not only the new management, but the senior, executive management as well. The integration of man and machine must be incorporated into a detailed strategic plan that allows for the ebbs and tides of a changing world. We sit on the brink of a very new and very dynamic Information Age. Only the educated, the trained and the technologically prepared will be able to successfully survive.

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